CLAIMS

1. A machine for inspecting ferrules of an optical connector, comprising:

a Cartesian coordinate type robot capable of performing 3-axis movement in X-axis, Y-axis and Z-axis directions;

a fixing means installed to move in a Y-axis direction by means of the robot for arranging a plurality of ferrules in a Cartesian coordinate system;

an optical system provided to move in X-axis and Y-axis directions by means of the robot for obtaining inside diameter and outside diameter image data of each of the plurality of ferrules;

a first illumination means positioned below the fixing means for illuminating each of the plurality of ferrules with back light;

a second illumination means positioned to move integrally with the optical system for illuminating each of the plurality of ferrules; and

a computer for processing the inside diameter and outside diameter image data from the optical system by means of a computer program.

2. The machine as claimed in claim 1, wherein the fixing means comprises:

a tray in which a plurality of holes accommodating the ferrules define the Cartesian coordinate system;

a transparent upper pressing means mounted on a top surface of the tray for aligning the ferrules by pressing upper ends of the ferrules accommodated in the holes of the tray; and

a lower pressing means installed in the holes of the tray for aligning the ferrules by pressing lower ends of the ferrules accommodated in the holes of the tray.

3. The machine as claimed in claim 1, wherein the optical system comprises a first camera with a narrow view for photographing an inside diameter image of each of the ferrules and outputting the inside diameter image data, and a second camera with a wide view for photographing an outside diameter image of each of the ferrules and outputting the outside diameter image data.

4. The machine as claimed in claim 3, wherein the first camera

comprises an objective lens, a beam splitter, an extending lens and a first image sensor that are sequentially aligned on a first optical axis of the optical system, and the second camera comprises a mirror for reflecting the light coming from the beam splitter to a second optical axis of the optical system and a second image sensor aligned on the second optical axis.

5. The machine as claimed in claim 1, wherein the first illumination means comprises:

a plurality of light emitting diodes arranged to illuminate an inside diameter of each of the ferrules arranged in the fixing means;

a plurality of condenser lenses for condensing light coming from each of the light emitting diodes; and

a diffuser for diffusing light coming from the condenser lenses.

6. The machine as claimed in claim 1, wherein the first illumination means comprises:

a plurality of light emitting diodes arranged to illuminate an inside diameter of each of the ferrules arranged in the fixture;

a diffuser that is disposed above the light emitting diodes and diffuses light coming from the light emitting diodes; and

a plurality of condenser lenses for condensing light coming from the diffuser.

7. The machine as claimed in claim 1, wherein the second illumination means comprises a plurality of light emitting diodes arranged concentrically with the objective lens of the optical system.

8. A method of inspecting ferrules of an optical connector, comprising the steps of:

preparing a plurality of ferrules by arranging the ferrules in a Cartesian coordinate system;

centering an optical system on one ferrule of the ferrules;

focusing the optical system on the one ferrule of the ferrules to obtain inside diameter and outside diameter image data of the one ferrule;

moving each of the remaining ferrules and the optical system to positions corresponding to each other and sequentially obtaining inside

diameter and outside diameter image data of each of the remaining ferrules by means of the optical system;

calculating an inside diameter, an outside diameter and eccentricity of each of the ferrules by processing the inside diameter and outside diameter image data of each of the ferrules by means of a computer program; and

sorting each of the ferrules as superior ferrules if the inside diameter, the outside diameter and the eccentricity of each of the ferrules satisfy a tolerance and displaying the ferrules.

9. The method as claimed in claim 8, wherein the step of focusing the optical system is performed by applying Laplacian evaluation to the inside diameter and outside diameter image data input from the optical system while causing focus distance of the optical system placed at a distant position from the one ferrule to approach the one ferrule.

10. The method as claimed in claim 8 or 9, wherein the inside diameter image data of each of the ferrules are obtained through photographing performed by a first camera with a narrow view of the optical system, and the outside diameter image data of each of the ferrules are obtained through photographing performed by a second camera with a wide view of the optical system.

11. The method as claimed in claim 8, wherein in the step of calculating the eccentricity of each of the ferrules, if there are two inside diameters, the distance between the center of an outside diameter and a midpoint of a line connecting the centers of the two inside diameters is calculated and the distance between the centers of the two inside diameters is further calculated.